

REMARKS

The Examiner states that he has fully considered Applicants' arguments filed on November 18, 2003 and find them not to be persuasive. The Examiner disagrees with Applicants' position that Yee '258 does not teach, suggest or imply the spacecraft radiator system of the instant invention wherein one or more coupling heat pipes are cross coupled to opposite facing payload and deployable radiators. The Examiner contends that Yee '258 does suggest the spacecraft radiator system of the instant invention directs Applicants' attention to col. 2, lines 15-35. Further, the Examiner contends that Yee states that "one loop heat pipe 11 may be coupled to north, south, east, west, earth, and anti-earth facing radiator panels 13 or any combination thereof". The Examiner concludes by restating the rejection of claims 1 through 5 made in the previous office action dated September 9, 2003 and making same final.

Applicants respectfully submit that in Yee '258 at col. 2, lines 15-35 it is stated "The exemplary loop heat pipe cooling system 10 comprises multiple loop heat pipes 11 that are routed from internally facing surfaces of one or more internally located equipment panels 12 to externally located radiator panels 13. In the exemplary embodiment, the externally located radiator panels 13 are illustrated as north-facing and south-facing radiator panels 13. However, it is to be understood that the spacecraft 20 may having earth-facing, anti-earth facing, north-facing, south-facing, east-facing and west-facing radiator panels 13.

The total number of loop heat pipes 11 used in the cooling system 10 depends on the overall heat load. The loop heat pipes 11 are distributed to any number of opposite facing radiator panels 13. For example, one loop heat pipe 11 may be coupled to the north-facing radiator panel 13 and one loop heat pipe 11 may be coupled to the south-facing radiator panel 13. Alternatively, one loop heat pipe 11 may be coupled to north, south, east, west, earth and anti-earth facing radiator panels 13, or any combination thereof.

Loop heat pipes 11 are similarly distributed and routed for each of the internally located equipment panels 12, although this is not an absolute requirement.

Applicants respectfully contend that as previously stated Yee '258 neither teaches, suggests nor implies the spacecraft radiator system of the instant invention wherein one or more coupling heat pipes are cross coupled to opposite facing payload and deployable radiators. Such a teaching is not only conspicuously absent in Yee but also in Esposto 5,743,325 and Applicants respectfully submit that it would not be obvious, as the Examiner contends, to modify Esposto's invention by providing one or more heat pipes that cross couple opposite facing payload radiators in order to increase the cooling process as in Yee

since Yee clearly does not teach one or more coupling heat pipes that cross couple opposite facing payload and deployable radiators as in the invention of the instant claims.

As previously submitted, Applicants again respectfully contend that nowhere in Esposto is there any suggestion that one or more coupling heat pipes may be employed to cross couple opposite facing payload and deployable radiators as in the instant invention.

Applicants again respectfully conclude that Yee '258 does little to cure this deficiency and may not properly be combined with Esposto '325 since Esposto is primarily directed to a closed loop heat pipe transport design for a deployment application having a flexible section which connects to a payload structure and a deployable structure while Yee '258 is directed to a loop heat pipe cooling system routed from internally facing surfaces of one or more internally located equipment panels to externally located radiator panels.

Applicants again respectfully submit that in Yee '258 it is seen that heat is collected at the evaporator ends of each loop heat pipe and transported to condenser ends of the respective loop heat pipe and not to one or more coupling heat pipes that cross couple opposite facing payload and deployable radiators as in the claims of the instant invention.

Applicants respectfully direct the Examiner's attention to col. 1 of Yee '258 at lines 42-57. Therein it is stated "The condenser end of each loop heat pipe may either be embedded within the radiator panel as to provide a direct condensing loop heat pipe radiator panel or externally mounted to the radiator panel as a loop heat pipe condensing flange. Fixed conductance heat pipes may additionally be used in any or all of the internal panels and radiator panels in order to collect and distributed heat loads to and from the loop heat pipes.

The loop heat pipes used in the cooling system have a much higher heat transport capability than fixed conductance heat pipes. The loop heat pipes used in the cooling system are flexible and easily routed. The loop heat pipes used in the cooling system can be routed to multiple radiator panels in order to optimize heat sharing between radiator panels.

Applicants respectfully direct the Examiner's attention to the recitation "fixed conductance heat pipes" at line 47 and in lines 53-54 "the loop heat pipes used in the cooling system are flexible and easily routed." Applicants respectfully submit that this in no way contemplates, discloses, suggests or implies deployable radiators as required in the instant claims. This deficiency may not be cured by Esposto '325 since its combination with Yee '258 is improper as non-analogous art in view of Esposto's being directed to primarily a closed heat loop pipe transport design for a deployment application having a flexible section which connects to a payload structure and a deployable structure while Yee '258 is directed to a loop heat pipe cooling system routed from internally facing surfaces of one or more internally located equipment panels to externally located radiator panels.

There is no suggestion whatever in either of Esposto '325 or Yee '258 that they be combined in the manner suggested by the Examiner and Applicants respectfully contend that the only basis for doing so is Applicants' own disclosure and invention.

The Examiner has rejected claims 3, 4 and 5 under 35 U.S.C. 103(a) as being unpatentable over Esposto U. S. Patent 5,743,325 as applied to claims 1 and 2 above and further in view of Caplin U. S. Patent 5,806,800. The Examiner goes on to say that Esposto discloses Applicants' invention as claimed with the exception of providing a body and a plurality of solar arrays.

The Examiner contends that Caplin discloses a dual function deployable radiator cover that does provide a body 12 (see Fig. 1) and a plurality of solar arrays 18 (see Fig. 1). The Examiner therefore concludes it would have been obvious to modify Esposto's invention by providing a body and a plurality of solar arrays in order for the invention to function properly.

Applicants again restate the distinctions drawn above with regard to the Esposto reference, including but not limited to the exception as noted by the Examiner of providing one or more heat pipes that cross couple opposite facing payload radiators, as found in the instant claims which are hereby respectfully incorporated by reference.

Applicants further respectfully submit that in Caplin '800 there is disclosed a dual function deployable radiator and radiator cover for use on a communication satellite. A deployable radiator is folded or in a "stowed" configuration over a fixed radiator when a satellite is in a launch vehicle. The deployable radiator thereby serves as insulation for the satellite when heat rejection is not necessary. When heat rejection becomes necessary, the deployable radiators are deployed whereby unwanted heat is rejected from the satellite. The deployable radiators, therefore serve a dual purpose, functioning as insulators for part of a mission and radiators for the remainder.

Applicants again respectfully direct the Examiner's attention to what may be clearly seen in Figs. 2 and 3 in Caplin '800 illustrating that the payload radiators are connected to deployable radiators on the same side of the satellite and not on opposite sides of the satellite which does not satisfy the significant limitation of the claims of the instant invention.

Furthermore, as previously pointed out, at column 3, line 35 et. seq. there is disclosed "There are fixed and deployable radiators on a payload structure 36. Typically, fixed radiators are employed on the sides of the satellite. Up to four deployable radiators may be located on the exterior of the satellite, each connected to the payload structure by (1) a hinge and (2) a means for "transferring heat generated by heat dissipating elements in the payload module to the deployable radiator."

Applicants again respectfully submit that this connection is seen to be a deployable to payload radiator configuration clearly on the same side of the satellite. Further, in Fig. 3 of Caplin '800, Applicants respectfully submit there is an illustration showing deployable radiators 62, 64, 66, 68 in the deployed position; and fixed radiators 70, 72 which are exposed upon deployment of the deployable radiators. Before deployment, the deployable radiators 62, 64, 66, 68 cover the fixed radiators 70, 72 and serve as insulators for the satellite. After deployment, Applicants respectfully submit, the heat rejecting surfaces of the deployable radiators 62, 64, 66, 68 are exposed to space and work to reject unwanted heat from the satellite. The deployable radiators 68, 66 are clearly connected to payload radiators 72 on one side of the satellite while on the other side of the satellite deployable radiators 62, 64 are connected directly to the payload radiator 70 on the other side of the satellite.

Applicants again respectfully contend that this is clearly distinguishable from the deployable to payload coupling configuration on opposite sides of the satellite as recited in the claims of the instant invention.

Applicants respectfully submit that Esposto '325 does not teach, suggest or imply the novel system of the instant invention and that Yee '258 or Caplin '800 may not be properly combined with Esposto in any manner to render the claims of the instant invention obvious under 35 U.S.C. 103(a).

To be fully responsive, Applicants note that the Examiner has restated that the prior art of record and not relied upon is considered pertinent to Applicants' disclosure, but since said prior art has not been specifically applied, no further comment is deemed warranted.

In view of the above remarks, Applicants respectfully contend that all of the claims presently under prosecution have been shown to contain patentable subject matter and to be patentably distinguishable over the prior art of record including Esposto '325 in any combination with either of Yee '258 or Caplin '800.

Accordingly, it is respectfully submitted that the above entitled application be reconsidered and reviewed in view of the above remarks and that a Notice of Allowance be issued at any early date.

Respectfully submitted,



Anthony W. Karambelas
Registration No. 25,657

Karambelas & Associates
655 Deep Valley Drive, Suite 303
Rolling Hills Estates, CA 90274
Telephone: (310) 265-9565
Facsimile: (310) 265-9545